

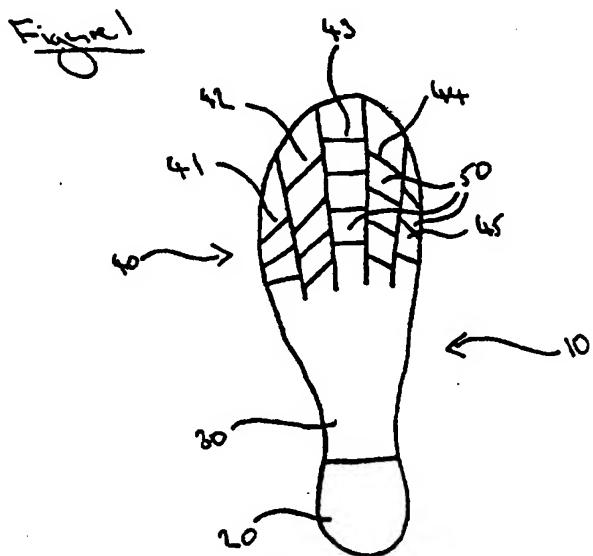
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(71) Applicant(s) Nicholas Francis Barrow 61 Motherwell Close, SOUTHPORT, PR8 5LT, United Kingdom	(58) Field of Search INT CL ⁶ A43B 13/16 ONLINE: WPI, EPODOC, JAPIO
(72) Inventor(s) Nicholas Francis Barrow	
(74) Agent and/or Address for Service McNeight & Lawrence Regent House, Heaton Lane, STOCKPORT, Cheshire, SK4 1BS, United Kingdom	

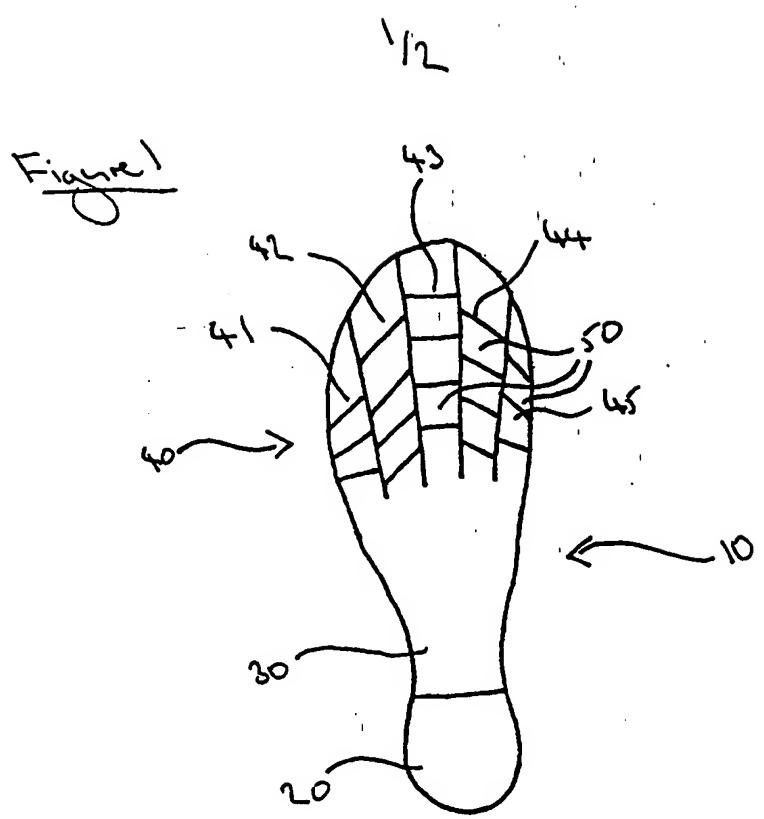
(54) Abstract Title
Shoe sole

(57) A shoe sole 10 comprises at least one division along the heel-toe direction which allows relative flexure of sole portions either side of the or each division. The sole preferably comprises four divisions resulting in five sole portions 41-45. The division(s) may extend from the toe end of the sole to at least halfway to the front part of the heel 20. At least one sole portion may be divided across the heel-toe direction. A further shoe sole (100, Fig. 2) is disclosed which comprises spikes or studs (120, Fig. 2) which are activated from a stowed to a deployed position by pressure from a user's body weight. Typically, the spikes or studs are stowed when no weight is applied. Different spikes or studs may be deployed under different pressures. A relatively rigid bar (130, Fig. 2) may be positioned across the heel-toe direction in either of the soles in order to control the relative flexure of the adjacent sole portions and/or deployment of the spikes or studs.



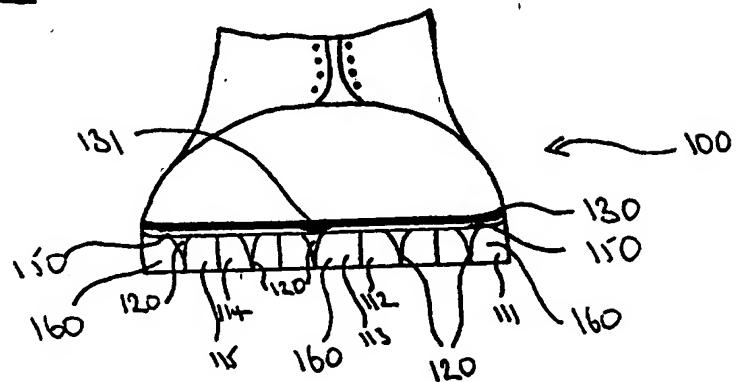
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Figure 2



SHOE

This invention relates to shoes, particularly to shoe soles.

Shoes are made in wide variety to suit any one or more of a number of requirements. Shoes essentially comprise a sole and a heel, usually integral or closely connected, with some kind of upper, which may range from a minimalist through-toe projection to keep the sole and heel in place up to a full upper including toe cap, welt, quarters and so forth, or even a full boot-type upper. Shoes may serve many purposes from purely facilitating walking to all manner of sporting requirements.

Shoe soles have, fundamentally, been more or less rigid, more or less flexible. Examples are relatively rigid leather soles of town shoes, relatively flexible soles of walking and games, e.g tennis, squash shoes

A capacity to flex, particularly at the instep, so that the toe can be bent back towards the heel, is present in most shoes; this is most marked in shoes with thin rubber or plastic soles, less so in leather or thick-soled shoes and boots and non-existent in ski boots. In relatively flexible shoes, a degree of twisting about the toe-heel axis is usually possible.

Shoe and boot designs, whilst being imaginative for style features, and being functional in regard to impact-cushioning, ankle support and grip, with tread patterns on sole and heel and, in certain sports footwear, bars, spikes and studs, are based, after centuries of development, on the traditional sole and heel platform.

The present invention provides shoes, and particularly shoes soles, that have improved functionality over conventional footwear facilitating better adaptation to different walking, working and sporting requirements.

The invention comprises a shoe sole having at least one division along the heel-toe direction allowing relative flexure of sole portions either side of said division.

The sole may have four such divisions resulting in five sole sections and permitting relative flexure between adjacent such sections.

At least one of said relatively flexible sole portions may itself be divided across the heel-toe direction, indeed each of said portions may be so divided, and any such portion may be multiply so divided.

The divisions in the heel-toe direction may extend from the toe end of the sole to the front part of the heel, or terminate short thereof.

Of course, the divisions will usually be connected by a sole-shaped web if only to hold them together but which may also form a water and dust impermeable barrier with some cushioning, particularly against direct contact of the foot with the edges of the divisions.

The provision of five such sole sections corresponds, of course, to the bone structure of the foot and better adapts the sole to the mechanics of the foot for weightbearing during activities such as walking and running, particularly during sports activities.

The invention also comprises a shoe sole having spikes or studs which are activated to move from a stowed position to a deployed position in response to forces acting on the sole, e.g. by pressure from body weight or under impact loading. The arrangement may be such that, when no weight is applied over the spike or stud, it is stowed.

The spikes or studs may be arranged in relatively flexible sole portions of a sole divided as described above. Different spikes or studs may be activated to be deployed in response to different pressures or circumstances. Actuation may be by way of toggle action spring means, for example, or fluid pressure arrangements, or of relatively compressible sections of a shoe sole where compression is caused by body weight being placed over it and results in the spikes protruding from the appropriate section of sole.

A shoe sole having relatively flexible section and/or spikes or studs as above described may also have at least one rigid or relatively rigid bar positioned across the heel-toe direction which controls relative flexure of adjacent sole portions and/or deployment of spikes or studs.

This is particularly important in the case of golfers who need to achieve a smooth rolling movement and transfer of body weight when taking a shot. It is important that weight is distributed correctly - if a shot is taken with the left foot forward, body weight being distributed diagonally across the foot (e.g. from the left side of the heel to the right side of the fore-foot) then the shot may well be "sliced". Controlling the flexure of the shoe and therefore exactly where weight may be distributed, helps achieve a correct shot.

Spike or stud arrangements as above described, may also, of course, be incorporated in a shoe heel.

Embodiments of shoe soles and shoes according to the invention will now be described with reference to the accompanying drawings, in which :-

Figure 1 shows a shoe sole having divisions along the heel-toe direction; and

Figure 2 shows a shoe having a sole having deployable studs.

As can be seen from the shoe sole 10 of Figure 1, the sole 10 comprises a heel 20 and mid-foot portion 30 and fore-foot portion 40 divided into 5 longitudinal sections 41-45. Each of sections 41-45 corresponds to a part of the bone structure of the foot and allows a "natural" flexure of the sole in a manner similar to that achieved by the foot, each of the sections 41-45 being capable of flexing independently of one-another. Each of sections 41-45 is also divided across the heel-toe direction to give a number of sub-sections 50 which are capable of a relative degree of free movement, although being constrained by the overall longitudinal section 41-45 of the sole to which they belong. Each of longitudinal sections 41-45 is separated from its neighbours(s) by a gap of about 3mm. Each longitudinal section 41-45 corresponds to an anatomical ray of the foot, a "ray" comprising the metatarsals and phalanges of a toe.

In use, the sole is more responsive to obstacles and irregularities such as stones etc. and encourages weight to be distributed in the arrangement of the longitudinal sections 41-45. This results in a more comfortable shoe incorporating the sole, and helps reduce foot injury and muscular fatigue etc. induced by intense excersising. In particular,

the sole conforms to the dynamic shape of the foot as it fulfills the contrasting functions of weight acceptance and propulsion. The sole allows a shoe to deform as the unshod foot does, allowing eccentric muscle function, which is inhibited by the more usual rigid soled shoes.

The shoe of Figure 2 is a golfing shoe 100 having heel-toe divided fore-foot sections 111-115 and deployable spikes 120, with a fore-foot semi-rigid bar section 130 going across the heel-toe direction and having a central "roller" 131. Spikes 120 are deployed when body weight is over a section of sole 11-115, each section 111-115 of sole comprising a relatively rigid upper 150 onto which the spikes 120 are mounted and a slightly compressible lower 160 through which the spikes 120 protrude when the lower portion 160 is compressed and in which the spikes 120 are stowed when lower portion 160 is not compressed. The semi-rigid bar section 130 ensures that adjacent fore-foot sections 111-115 move together in a limited fashion and also ensures that for example weight cannot be placed in a diagonal manner across the foot when it should not be. When taking a shot, bar section 130 ensures that the weight of the golfer is distributed over the sole in longitudinal sections, ensuring that a correct shot is taken.

The invention will be further apparent from the following description, with reference to the several figures of the accompanying drawings, which show, by way of example only, one form of

CLAIMS

1. A shoe sole having at least one division along the heel-toe direction allowing relative flexure of sole portions either side of said division.
2. A shoe according to claim 2, having four such divisions resulting in five sole sections and permitting relative flexure between adjacent such sections.
3. A shoe sole according to claim 1 or claim 2, in which at least one of said relatively flexible sole portions is itself divided across the heel-toe direction.
4. A shoe sole according to claim 3, in which each of said sole portions is itself divided across the heel-toe direction.
5. A shoe sole according to claim 3 or claim 4, in which at least one of the said sole portions is multiply divided across the heel-toe direction.
6. A shoe sole according to any one of claims 1 to 5, in which the division or divisions in the heel-toe direction extend from the toe end of the sole back at least halfway to the front part of the heel.
7. A shoe sole having spikes or studs which are activated to move from a stowed position to a deployed position by pressure from body weight.
8. A shoe sole according to claim 7, such that when no weight is applied over the spike or studs, it is stowed.

9. A shoe sole according to claim 7 or claim 8, in which spikes and/or studs are arranged in relatively flexible sole portions of a sole according to any one of claims 1 to 8.

10. A shoe sole according to claim 9, in which different spikes or studs are activated to be deployed on different pressures.
11. A shoe sole according to any one of claims 1 to 10, in which at least one rigid or relatively rigid bar is positioned across the heel-toe direction which controls relative flexure of adjacent sole portions and/or deployment of spikes or studs.
12. A shoe having a sole according to any one of claims 1 to 11.



Application No: GB 9918938.3
Claims searched: 1-6, 11, and 12

Examiner: Dr Paul R Minton
Date of search: 28 October 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q):

Int Cl (Ed.6): A43B 13/16.

Other: ONLINE: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	US 4 779 361 A (KINSAUL). See particularly line 52, column 3, lines 40-42, column 4 & lines 28-30, column 5 and Figures 2 & 12.	1-6,11,12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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